Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

C78

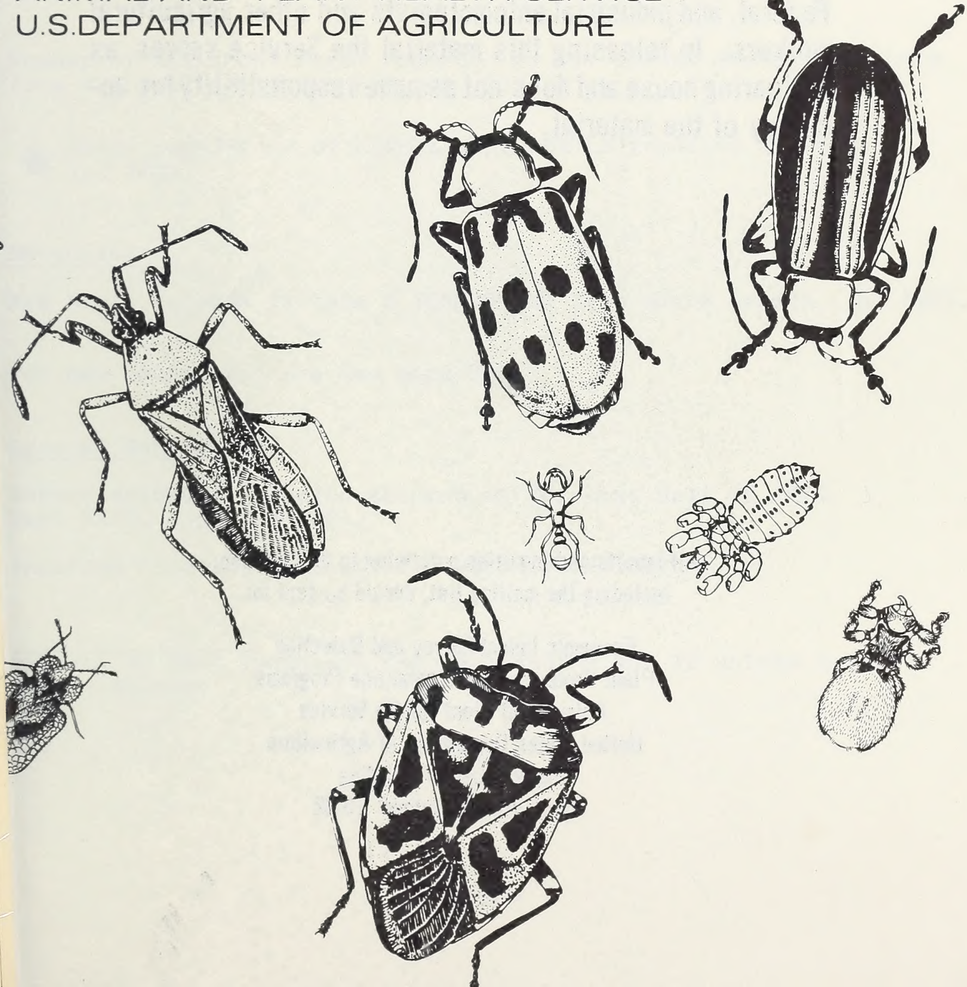
VOL. 22 No. 20

May 19, 1972

Cooperative Economic Insect Report

U.S. DEPT. OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY
RECEIVED
JUN 29 1972
PROCUREMENT SECTION
CURRENT SERIAL RECORDS

Issued by
PLANT PROTECTION AND QUARANTINE PROGRAMS
ANIMAL AND PLANT HEALTH SERVICE
U.S.DEPARTMENT OF AGRICULTURE



ANIMAL AND PLANT HEALTH SERVICE
PLANT PROTECTION AND QUARANTINE PROGRAMS
ECONOMIC INSECT SURVEY AND DETECTION STAFF

The Cooperative Economic Insect Report is issued weekly as a service to American Agriculture. Its contents are compiled from information supplied by cooperating State, Federal, and industrial entomologists and other agricultural workers. In releasing this material the Service serves as a clearing house and does not assume responsibility for accuracy of the material.

All reports and inquiries pertaining to this release, including the mailing list, should be sent to:

Economic Insect Survey and Detection
Plant Protection and Quarantine Programs
Animal and Plant Health Service
United States Department of Agriculture
Federal Center Building
Hyattsville, Maryland 20782

Volume 22 May 19, 1972 Number 20

COOPERATIVE ECONOMIC INSECT REPORT

HIGHLIGHTS

Current Conditions

ARMYWORM larvae heavy in fescue grass in portion of Alabama, continue heavy in Mississippi Delta areas. Damaged pastures in limited area of Tennessee. Heavy in eastern Arkansas. Controls applied in small grain fields with heavy growth in Missouri. (p. 277).

CORN LEAF APHID heavy in grain sorghum in north-central Texas. (p. 277).

ALFALFA WEEVIL damage to alfalfa heavier than expected in portions of Virginia; about 30 percent of alfalfa fields in central Maryland need controls. Continues heavy in southern Missouri, still heavy in some areas of Oklahoma. Damage expected in some areas of South Dakota. (pp. 278-279).

Number of SCREWWORM cases reported in the United States increased from 434 past period to 609. (p. 281).

● Heavy population of CEREAL LEAF BEETLE reported in Ohio. (p. 282).

Detection

New State records include 5 ICHNEUMONS from North Dakota. (p. 282).

For new county records see page 282.

Special Reports

Survey Methods. Selected References for Last Half of 1970. Part XXXV. (pp. 285-298).

Imported Fire Ant Quarantines. Map. Centerfold.

Reports in this issue are for week ending May 12 unless otherwise indicated.

CONTENTS

Special Insects of Regional Significance....................277

Insects Affecting

Corn, Sorghum, Sugarcane....277
Turf, Pastures, Rangeland...278
Forage Legumes..............278
Cotton......................279
Sugar Beets.................279
Miscellaneous Field Crops...280
Potatoes, Tomatoes, Peppers.................280
General Vegetables........280
Deciduous Fruits and Nuts.280
Small Fruits..............280
Forest and Shade Trees....280
Man and Animals...........281

Beneficial Insects....................282
Federal and State Plant Protection Programs....................282
Detection....................282
Hawaii Insect Report....................283
Light Trap Collections....................284
Survey Methods. Selected References for Last Half of 1970. Part XXXV....................285
Imported Fire Ant Quarantines. Map. Centerfold.

WEATHER OF THE WEEK ENDING MAY 15

Reprinted from Weekly Weather and Crop Bulletin supplied by Environmental Data Service, NOAA.

PRECIPITATION: Rain fell over most of the eastern third of the Nation Monday April 8. Precipitation was especially generous along a quasi-stationary front that stretched from Illinois to Maryland. This front separated cool air to the north from warm, humid air south of the front. One heavy downpour at Lincoln, Illinois, dumped 5.01 inches of rain in 6 hours. Scattered showers occurred also from the Pacific Northwest to the northern and central Great Plains. As the storm system producing rains east of the Mississippi River moved eastward, it was followed by a large high that brought sunny skies. New storms developed west of the high. One of these dampened much of South Dakota, eastern Wyoming, and parts of Nebraska. The other soaked parts of Texas. Over 6 inches of rain splashed down on Beeville, Texas, Wednesday afternoon. Beeville is about 35 miles northwest of Corpus Christi. As thunderstorms, some accompanied by hail and high winds, dotted the central and southern High Plains, snow fell in the central Rocky Mountains accumulating to 3 inches at Rock Springs, Wyoming. Generous rains fell late in the week and over the weekend from the Great Plains to the Atlantic Ocean. A "cloudburst" of up to 10 inches north of New Braunfels, Texas, Thursday night sent a wall of water estimated at 30 feet in height down Blueders Creek into the Comal and Guadalupe Rivers washing away people, houses, and automobiles. Sixteen persons were drowned, 9 still missing, and property damage has been estimated at $20 million. Weekly totals exceeded 1 inch over much of the eastern half of the Nation. Stations along the Ohio River received from 1 to over 4 inches. Totals in Texas ranged from none in the extreme west to over 10 inches in the Guadalupe River Basin. This is the 20th week with no rain or only light sprinkles in the Far Southwest. Weather of the week continued on page 283.

SPECIAL INSECTS OF REGIONAL SIGNIFICANCE

ARMYWORM (Pseudaletia unipuncta) - ALABAMA - Larvae ranged 2-10 per square foot in no-till corn in Morgan County, 2-4 per square yard of wheat in Colbert County, where damage light, and 10-30 per square foot of fescue in southern Limestone County. (Rutledge et al.). MISSISSIPPI - Still heavy in some delta counties. Heavy in Tallahatchie County, light to heavy in Tunica County, light in Washington County, and spotty in Quitman County. (Robinson). TENNESSEE - Larvae heavy and damaging alfalfa and pastures in Obion County. Controls planned. (Mullett, Martin). ARKANSAS - Scattered larval infestations continued and few fields treated in eastern areas. Heaviest larval count of 8-10 per square foot in Clay County. (Boyer et al.). MISSOURI - Larvae ranged 1-17 per square foot in wheat and barley fields with heavy growth; noneconomic in thin stands. Chemical controls applied. (Houser). Larvae ranged 3-10 per square foot in orchard grass and fescue in southwest area. Heavier counts (5-16) found in few dense stands of barley in this area. Larvae in southwest area still too small to treat. (Munson). KANSAS - Very light, less than 0.5 per row foot of up to half-grown larvae in wheat in Montgomery, Labette, and Crawford Counties. (Bell). DELAWARE - Adults continue to increase in blacklight trap in Sussex County. (Burbutis).

ARMY CUTWORM (Euxoa auxiliaris) - WYOMING - Larvae ranged 0-3 (averaged less than 1) per square foot in 2 alfalfa fields in Park County. None in 3 fields in Washakie and Hot Springs Counties. (Burkhardt). NEVADA - Counts of 2-4 per alfalfa crown in Diamond Valley, Eureka County, and 1 per alfalfa crown on scattered plants in Grass Valley, Lander County. (Peters, Wilson).

CORN LEAF APHID (Rhopalosiphum maidis) - TEXAS - Scattered and heavy infestations throughout north-central area. Infestations continue heavy in Bell, Hill, McLennan, and Falls Counties. Beneficial insects beginning to increase; control measures have not been applied. (Hoelscher, Turney).

SPOTTED ALFALFA APHID (Therioaphis maculata) - KANSAS - Ranged 300-400 per 10 sweeps in Barber County alfalfa. (Bell).

CORN, SORGHUM, SUGARCANE

EUROPEAN CORN BORER (Ostrinia nubilalis) - MINNESOTA - Potential for heavy first generation continues for 1972. Overwintering populations in southwest, south-central, southeast, and west-central districts heavy enough to cause damage. Winter larval mortality light and not expected to change outlook. Weather conditions in June will determine intensity of infestation. (Minn. Pest. Rpt.). IOWA - Spring survey of oatfields with cornstalk debris completed May 10. Sample of 5 square yards at each stop. Total of 45 stops and live borers 282. Live borers per acre 6,074 compared with 6,375 in 1971. (Iowa Ins. Sur.). DELAWARE - First adults of season in blacklight traps in Sussex County on May 7; pupation 60 percent in this area. (Burbutis).

FALL ARMYWORM (Spodoptera frugiperda) - FLORIDA - Unusually abundant for time of year; comprised 84 percent of larvae on unsprayed check plants of sweet corn at Belle Glade, Palm Beach County, with 56 percent of ears damaged. (Janes).

CORN ROOTWORMS (Diabrotica spp.) - MINNESOTA - Populations heavy enough in some districts to cause damage in 1972, especially in southeast and south-central districts, and to lesser extent in southwest and east-central districts. (Minn. Pest Rpt.).

CORN FLEA BEETLE (Chaetocnema pulicaria) - MISSOURI - Adults ranged 1-11 per small corn plant in southwest area. Some controls applied. (Munson).

A WIREWORM (Melanotus communis) - NORTH DAKOTA - Larvae ranged 1-2 per square foot in Ransom County field. Economic damage occurred to corn in same field in 1971. (McBride).

TURF, PASTURES, RANGELAND

BROWN WHEAT MITE (Petrobia latens) - WASHINGTON - Nymph and adult damage ranged 20-30 percent to orchard grass in several fields in Grant County. (Foeppel).

FORAGE LEGUMES

ALFALFA WEEVIL (Hypera postica) - VIRGINIA - Based on 11 fields sampled (89 acres), 94 percent of tips infested in alfalfa less than 7 inches tall. Average defoliation 21.5 percent with 54.4 percent of fields surveyed exceeding treatment threshold. Damage in Shenandoah Valley area heavier than expected. (Allen). MARYLAND - Current damage above 1971 level at this time. Damaged tips ranged 10-80 percent, averaged 30 percent in most fields in Frederick, Baltimore, and Prince Georges Counties. Percent tip damage ranged 0-70 in Queen Annes, Talbot, Dorchester, and Somerset Counties, averaged below 30 percent in most fields. Pupation noted in Eastern Shore. Estimated 30 percent of fields in central areas may require controls. Most growers on Eastern Shore should be able to avoid sprays by cutting early. (U. Md. Ent. Dept.). OHIO - Larval populations light to moderate. Counts per 50 sweeps by county: Morgan 2-5; Washington 0-1; Perry 0-2; Vinton 0-1; Athens 5; Noble 30-50. Less than one bud per 100 plants damaged in Seneca County; about 1 per 100 noted in Franklin County. (Blair, Eisely). MICHIGAN - Adults 6 per 100 sweeps in Ingham County alfalfa. Egg laying underway in some southern counties. (Ruppel, Sauer). ILLINOIS - Area of potential economic damage (20 larvae per sweep) south of line from Hancock County in west to Douglas County in east. Larval populations apparently heavier in western areas than eastern areas of same latitude. (Ill. Ins. Sur.).

MISSOURI - Most H. postica pupated and emerged in southeast area and alfalfa cut. (Houser). Larvae ranged 20-500 per 10 sweeps in southwest area. All larval stages present and adult emergence underway. Chemical controls still being applied in this area. Harvest started. (Munson). ARKANSAS - Declined to 800 per 100 sweeps from 2,000 per 100 sweeps previous week in field checked weekly in Washington County. (Boyer). OKLAHOMA - Adults decreased in Garvin and Choctaw Counties. Still heavy in alfalfa in Payne (20-50 per square foot), Kay, Osage, and Cleveland Counties. Moderate to heavy in Wagoner County. (Okla. Coop. Sur.). KANSAS - Larval counts decreased in alfalfa in southeast areas. Counts of 200+ per 10 sweeps continue in some fields in Crawford and

Bourbon Counties. Larvae ranged 10-175 per 10 sweeps in other counties in this area. Pupation underway. Adult emergence noted. Many fields cut show no signs of infestation on regrowth. Generally in eastern and western areas no economic damage reported. (Gates). SOUTH DAKOTA - Expect damaging infestations in alfalfa in Fall River, Custer, Pennington, Lawrence, Butte, and Meade Counties. (Jones et al.). NEVADA - H. postica larvae ranged 1-15 per sweep of alfalfa in Pershing County. (Stitt). Ranged 4-10 per sweep of alfalfa hay in Churchill County. About 300 acres treated. (Adams, Arnett).

PEA APHID (Acyrthosiphon pisum) - SOUTH DAKOTA - Weather conditions could influence outbreak on alfalfa in southern areas next few weeks. (Jones et al.). KANSAS - Increased in central area alfalfa. Up to 2,200 per 10 sweeps noted in Barber County field, with 10 percent parasitized. Trace parasitism noted in other fields. Currently alfalfa statewide could withstand heavy populations without serious damage, depending on weather conditions. (Gates). ARIZONA - Counts ranged 180 to 10,050 per 100 sweeps of alfalfa in Yuma and Maricopa Counties. (Ariz. Coop. Rpt.).

REDBACKED CUTWORM (Euxoa ochrogaster) - OREGON - Larvae heavy, ranged 25-30 per square foot of seed alfalfa in Madras area of Jefferson County. More widespread than in 1971. (Robinson, Berry).

LYGUS BUGS (Lygus spp.) - NEVADA - Nymphs averaged 1 per sweep on alfalfa at Lovelock and ranged 1-10 per sweep in seed fields in Dixie Valley, Pershing County. Treatments applied in latter area. (Stitt).

GRASSHOPPERS - MINNESOTA - Moderate to heavy infestations expected in 1972 in east-central, central, west-central, and south-central areas. Alfalfa and other forage crops will be primary host crops. (Minn. Pest Rpt.).

BROWN WHEAT MITE (Petrobia latens) - NEVADA - Heavy on alfalfa hay in sandy soil or dry fields in Churchill County. Some chemical treatments applied. (Adams).

COTTON

BOLL WEEVIL (Anthonomus grandis) - TENNESSEE - Trapped 55 weevils in 24 of 27 traps in McNairy and Hardeman Counties. Weevils moving from hibernation sites into fields. (Cherry).

SUGAR BEETS

BEET WEBWORM (Loxostege sticticalis) - COLORADO - Adult flight heavy in Larimer County early May. (Thatcher).

SUGARBEET ROOT MAGGOT (Tetanops myopaeformis) - WYOMING - First adult emergence in Powell area, Park County, May 12. (Burkhardt). COLORADO - Adults appeared early May in northeastern area. (Marquardt, Jenkins).

MISCELLANEOUS FIELD CROPS

REDBACKED CUTWORM (*Euxoa ochrogaster*) - OREGON - Larvae ranged 2-5 per square foot in new and established mint plantings in Culver area of Jefferson County. (Robinson, Berry).

POTATOES, TOMATOES, PEPPERS

COLORADO POTATO BEETLE (*Leptinotarsa decemlineata*) - TENNESSEE - Populations light to heavy statewide on potatoes. Controls, when applied, effective. (Gordon).

GENERAL VEGETABLES

REDBACKED CUTWORM (*Euxoa ochrogaster*) - WASHINGTON - Second and third instar larvae caused 10-15 percent damage to 20 acres of asparagus at Sunnyside, Yakima County. Control difficult. (Cone).

GRANULATE CUTWORM (*Feltia subterranea*) - FLORIDA - Larvae damaged 55 percent of celery in unsprayed check plots at Belle Glade, Palm Beach County, April 29. Stalks unmarketable. (Janes).

DECIDUOUS FRUITS AND NUTS

COTTON SQUARE BORER (*Strymon melinus*) - TEXAS - Light to moderate on pecan nutlets in 2 large orchards in El Paso County. Estimated 30-40 nutlets destroyed per larva. Controls applied. (Neeb).

CODLING MOTH (*Laspeyresia pomonella*) - CALIFORNIA - Moth flights peaked April 28; second treatments underway on apples and pears in Sacramento and Yolo Counties. (Cal. Coop. Rpt.).

REDBANDED LEAFROLLER (*Argyrotaenia velutinana*) - OHIO - Adults emerged April 29-30 in Wayne County. (Hall).

EUROPEAN RED MITE (*Panonychus ulmi*) - INDIANA - Ranged 1-37 per apple leaf in untreated trees in Madison County. None noted in treated trees. (Matthew). OHIO - Hatch began May 4 in Wayne County. (Hall).

SMALL FRUITS

A FLEA BEETLE (*Altica ignita*) - ARKANSAS - Heavy in Scott County strawberries. (Boyer).

TARNISHED PLANT BUG (*Lygus lineolaris*) - MICHIGAN - Adults increased. Particularly numerous in and about strawberry plantings, but also in many apple, peach, and pear orchards in southern counties. (Thompson).

FOREST AND SHADE TREES

CONIFER SAWFLIES (*Neodiprion* spp.) - KENTUCKY - *N. taedae linearis* larval defoliation 30-40 percent on loblolly pines in Calloway, Graves, and Marshall Counties. Defoliation 10-20 percent to loblolly pines in Hickman, Fulton, and Carlisle Counties. (Barnett). TENNESSEE - Early instar larvae of *N. pratti pratti* on pine in Knox County for a new county record. Specimens also noted in Lincoln County. (Mullett).

A LEAFMINING WEEVIL (*Odontopus calceatus*) - WEST VIRGINIA - Adult damage heavy to 90 percent of foliage of most yellow poplar in Clay County. (W. Va. Ins. Sur.).

PINE SPITTLEBUG (*Aphrophora parallela*) - MISSISSIPPI - Light to moderate on loblolly pine statewide. Ranged 2-3 per tree in Grenada and Montgomery Counties. (Killebrew).

PLANT BUGS (*Tropidosteptes* spp.) - CALIFORNIA - Heavy populations of *T. illitus* defoliated, or nearly defoliated 3,500 ash trees in Santa Barbara County. *T. pacificus* appearing on new foliage, nearly 30 days early. Increased past 3 years and now in epidemic populations in several areas of State. (Cal. Coop. Rpt.).

PERIODICAL CICADA (*Magicicada septendecim*) - MISSISSIPPI - Emergence noted in many areas of State. (Robinson). ALABAMA - Adult emergence heavy and widespread in Montgomery County. (McCabe).

MAN AND ANIMALS

SCREWWORM (*Cochliomyia hominivorax*) - Total of 609 cases reported in U.S. May 7-13 as follows: TEXAS: Atascosa 10, Bandera 4, Bastrop 1, Bee 14, Bexar 3, Blanco 1, Brewster 3, Brooks 31, Caldwell 6, Cameron 3, Coleman 1, Crockett 1, De Witt 9, Dimmit 29, Duval 15, Edwards 2, Fayette 1, Frio 16, Gillespie 2, Goliad 17, Gonzales 3, Guadalupe 1, Hidalgo 38, Hudspeth 1, Jackson 2, Jim Hogg 18, Jim Wells 30, Karnes 6, Kendall 2, Kenedy 16, Kerr 3, Kinney 13, Kleberg 11, La Salle 15, Lavaca 17, Live Oak 33, Maverick 7, McMullen 9, Medina 9, Nueces 4, Pecos 2, Presidio 2, Real 7, Refugio 8, San Patricio 5, Starr 48, Sutton 1, Terrell 1, Tyler 1, Upton 1, Uvalde 8, Val Verde 5, Victoria 12, Washington 3, Webb 38, Willacy 2, Wilson 18, Zapata 23, Zavala 8. ARIZONA: Cochise 1, Maricopa 1, Pima 4, Pinal 1, Santa Cruz 1. OKLAHOMA: Jefferson 1. Total of 430 laboratory-confirmed cases reported in portion of Barrier Zone in Republic of Mexico as follows: Sonora 132, Chihuahua 29, Coahuila 119, Nuevo Leon 48, Tamaulipas 102. Total of 50 cases reported in Mexico south of Barrier Zone. Barrier Zone is area where eradication operation underway to prevent establishment of self-sustaining population in U.S. (Anim. Health).

HORN FLY (*Haematobia irritans*) - OKLAHOMA - Ranged 250-300 per head on cattle in Payne and Mayes Counties. Heavy in Marshall County, moderate to heavy in Garvin County, and moderate in Seminole and Cleveland Counties. (Okla. Coop. Sur.). MISSISSIPPI - Populations at highest peak of season. Beef cattle in Marion County averaged 175 per animal; in Oktibbeha and Monroe Counties, averaged less than 100. (Robinson).

MOSQUITOES - MINNESOTA - Percent larval samples in Ramsey and Hennipen Counties show *Aedes excrucians* in 37, *A. fitchii* in 24, *A. cinereus* and *A. stimulans* in 17, *A. vexans* in 9, *A. flavescens* in 5, *A. riparius* and *A. canadensis* in 3, and *A. spenceri* and *A. abserratus* in 2. *Culiseta inornata* in 57 percent of larval collections and increasing. Week ending May 12 *A. vexans* and *A. cinereus* increased sharply. Early spring single-brood *Aedes* such as *A. excrucians*, *A. stimulans*, *A. fitchii* pupating. No adults collected to date. (Minn. Pest Rpt.). INDIANA - Adults of *Aedes vexans* and *A. sticticus* numerous and annoying in southwest district, landing at rate of 8-10 per minute on arm. (Sanders).

A BLACK FLY (*Simulium venustum*) - NORTH DAKOTA - Adults emerged May 7 in Cass County. (Brandvik).

GULF COAST TICK (*Amblyomma maculatum*) - OKLAHOMA - Infested 14 of 40 cattle from Mayes, Rogers, and northern Wagoner Counties. Wagoner and Rogers Counties are new records. (Okla. Coop. Sur.).

BENEFICIAL INSECTS

ICHNEUMONS - NORTH DAKOTA - Specimens collected in Benson County from *Malacosoma disstria* (forest tent caterpillar) July 1, 1971 by D. A. Ramse as follows: *Theronia atalantae fulvescens*; *Scambus (Scambus) tecumseh*; *Coccygomimus pedalis*; *Itoplectis conquisitor*; and *Hyposoter fugitivus* (June 20). Determinations by M. Wasbauer. These are new State records. (Brandvick).

FEDERAL AND STATE PLANT PROTECTION PROGRAMS

CEREAL LEAF BEETLE (*Oulema melanopus*) - OHIO - Adults 610 per 100 sweeps, eggs ranged 300-500 per square foot and larvae 120 per square foot in Fairfield County. Heaviest population ever reported outside of southwest Michigan. (PP).

EUROPEAN CRANE FLY (*Tipula paludosa*) - WASHINGTON - Larvae 150 per square foot of pasture in Blaine area of Whatcom County; damage heavy early May. (Rosander et al.).

A GRASS BUG (*Irbisia brachycera*) - NEVADA - Heavy populations of adults migrated from drying rangeland and infested bluegrass lawns at Reno, Washoe County; damage heavy. (Foster, Wilcox).

GRASSHOPPERS - NEVADA - First to third instar nymphs of *Melanoplus sanguinipes* ranged 5-70 per square yard on 5,000 acres of alfalfa hay in Hualapai Valley, Washoe County. (Adams, Murphy). Mostly first instar nymphs of this species and *M. bivittatus* ranged 27-36 per square yard in localized areas of Diamond Valley, Eureka County. (Peters, Wilson). Nymphs, mostly *Oedaleonotus enigma*, ranged 8-10 per square yard on unspecified acreage in Humboldt County. (Rowe). IDAHO - First instar hatch in rangeland April 30 in Adams County. First and second instar nymphs of *Oedaleanotus enigma* ranged 5-35 per square yard in 60,000 acres of Owyhee County rangeland. (Pollard, Gibson).

GYPSY MOTH (*Porthetria dispar*) - RHODE ISLAND - First egg hatch in Washington County, May 10. (Relli).

DETECTION

New State Records - ICHNEUMONS - NORTH DAKOTA - *Theronia atalantae fulvescens*; *Scambus (Scambus) tecumseh*; *Coccygomimus pedalis*; *Itoplectis conquisitor*; *Hyposoter fugitivus*, Benson County. (p.282).

New County Records - A CONIFER SAWFLY (*Neodiprion pratti pratti*)- TENNESSEE - Knox (p.282). GULF COAST TICK (*Amblyomma maculatum*)- OKLAHOMA - Rogers, Wagoner (p.280).

HAWAII INSECT REPORT

New State Record - Collected 2 females of a CERATOPOGONID FLY (*Forcipomyia* (*Pterobosca*) *fusicornis*) in Palolo Valley, Oahu, on April 5, 1972, by S.F. Wong. Specimens found clinging to forewing of a damselfly (*Megalagrion* sp.). Determined by G. Y. Funasaki and F. G. Howarth, confirmed by W. W. Wirth. Reported from Florida, Louisiana, Puerto Rico, and Brazil. (Kawamura).

Corn - CORN PLANTHOPPER (*Peregrinus maides*) light, as many as 8 nymphs and adults per seedling, in whorls and leaf axils in 0.5 acre of corn at Waialua, Oahu. No predators. (Kawamura).

Turf and Pasture - Larval infestations on Maui of GRASS WEBWORM (*Herpetograma licarsisalis*) moderate and LAWN ARMYWORM (*Spodoptera mauritia*) light on Bermuda grass at Lahaina. *H. licarsisalis* larvae trace on Kikuyu grass pastures at Hana and Kipahulu. Less than 1 larva per square foot on grass at Kaneohe, Oahu. (Miyahira, Kawamura).

Fruits and Nuts - COCONUT LEAFROLLER (*Hedylepta blackburni*) moderate on about 75 percent of 100+ coconut trees at Lahaina, Maui. Larvae 3-4 per infested pinna and 25 percent of leaflets affected. Hymenopterous pupae light in leaflets. *H. blackburni* severe on about 1,000 coconut trees at Kahuku, Oahu. Skeletonized 90 percent of leaves. Larvae light on Kauai. (Sugawa, Kawamura).

Beneficial Insects - Larvae of LANTANA DEFOLIATOR CATERPILLAR (*Hypena strigata*) heavy in 1,000+ acres of lantana at Ulupalakua and Auwahi, Maui; defoliation near 100 percent. LANTANA LACE BUG (*Teleonemia scrupulosa*) also heavy in this area. Nymphs and adults of a TINGID BUG (*Leptobyrsa decora*) heavy at release site at Ulupalakua. LANTANA HISPID (*Uroplata girardi*) moderate to heavy on scattered lantana on Oahu. (Miyahira et al.).

Weather of the week continued from page 276.

TEMPERATURE: Hot weather continued in the southwestern deserts with afternoon temperatures reaching the 90's most days. Afternoon readings in the 70's and 80's were common elsewhere along the South. Cool air spilled southward from the Great Plains to New England. Subfreezing temperatures occurred over the Great Basin and the northern and central Rocky Mountains on one or two mornings. Flagstaff, Arizona, registered 22 degrees Wednesday morning and Elkins, West Virginia, recorded 28 degrees Thursday. Two large highs brought a pleasant weekend to much of the Nation. The western high brought sunny skies to the Pacific Coast and eastward to the western edge of the Great Plains. The eastern high brought sunny weather to the upper Mississippi River Valley and eastward to New England. Rochester, New York, warmed to 85 degrees Saturday afternoon. As highs brought fair weather to the west and the east, stormy weather with clouds and rain covered mid-America. Most of the Nation averaged cooler than normal in the second week of May. Spots in the Great Plains averaged 3 to 6 degrees cooler than normal.

LIGHT TRAP COLLECTIONS

	Temperature °F.	Precipitation (inches)	Type of trap (BL = blacklight, I = incandescent, MV = mercury vapor, O = other)	*Agrotis ipsilon* (black cutworm)	*Estigmene acrea* (saltmarsh caterpillar)	*Euxoa auxiliaris* (army cutworm)	*Faronta diffusa* (wheat head armyworm)	*Feltia subterranea* (granulate cutworm)	*Heliothis virescens* (tobacco budworm)	*H. zea* (bollworm, corn earworm, tomato fruitworm)	*Laspeyresia pomonella* (codling moth)	*Loxostege commixtalis* (alfalfa webworm)	*Loxostege rantalis* (garden webworm)	*Loxostege sticticalis* (beet webworm)	*Manduca quinquemaculata* (tomato hornworm)	*Manduca sexta* (tobacco hornworm)	*Ostrinia nubilalis* (European corn borer)	*Peridroma saucia* (variegated cutworm)	*Pseudaletia unipuncta* (armyworm)	*Spodoptera exigua* (beet armyworm)	*Spodoptera frugiperda* (fall armyworm)	*Spodoptera ornithogalli* (yellowstriped armyworm)	*Trichoplusia ni* (cabbage looper)	Crops
FLORIDA																								
Gainesville 5/5-11			BL	1				5		1									1			1	1	
KANSAS																								
Colby 5/3			BL			6												5	4					
Garden City 5/4, 8, 10			BL			6													2					
Great Bend 5/3-10			BL	6		132												20	114					
Tribune 5/1, 3, 9			BL			3												1						
MISSISSIPPI (County)																								
Copiah 5/5-11			BL	1				1								1						1		
Oktibbeha 5/5-11			BL															5	5			2		
Sharkey 5/5-11			BL															1				2		
Washington 5/5-11	50-82	.71	2BL	31				15	1	12								13	125			13		
MISSOURI																								
Portageville 5/5-11			BL							1								3	13					
OHIO																								
Reynoldsburg 5/5-11			BL	5														1	92					
Wooster 5/5-11			BL	17															345					
OREGON (County)																								
Lane 5/8-12			BL	1														5						
Marion 5/8-12			2BL	2														6						
TENNESSEE (County)																								
Dyer 5/8-12			BL					4		17							10		26				2	
Hardeman 5/8-12			BL	9				4									5	1	28				4	
Knox 5/8-12			BL	4																				
TEXAS																								
Waco 5/5-12			BL	18				27		28								5	2	2		24	4	
VIRGINIA																								
Blacksburg 5/5-9			BL	20															86					
Charlotte Court House 5/1-9			BL	1															3					
Holland 5/1-10			BL	2													18		7					
Warsaw 5/1-10			BL	14															32					
WISCONSIN																								
Hancock 5/5-10			BL																1					
Lancaster 5/4-9			BL															2	8					
Mazomanie 5/4-9			BL	1															2					

SURVEY METHODS

Selected References for Last Half of 1970

Part XXXV

Additional copies of Parts I through XXXV of this bibliography are available from Economic Insect Survey and Detection.

POPULATION MEASUREMENT

Fye, R. E. and Bonham, C. D. 1970. Analysis of populations of the boll weevil in one acre of cotton at Florence, South Carolina, in 1957-59. J. Econ. Ent. 63(5):1505-1510.

Leigh, T. F., Gonzalez, D., and van den Bosch, R. 1970. A sampling device for estimating absolute insect populations on cotton. J. Econ. Ent. 63(5):1704-1706.

Mason, R. R. 1970. Development of sampling methods for the Douglas-fir tussock moth, *Hemerocampa pseudotsugata* (Lepidoptera: Lymantriidae). Canad. Ent. 102(7):836-845.

FORECASTING

Sepros, I. 1970. The present system of forecasting in Hungary. Eur. Mediterr. Plant Protect. Organ. Pub. Ser. A 57:191-194. Shorter version in French, pp. 193-194.

Szalay-Marzsó, L. 1970. The *Myzus persicae* Sulz. observation network and forecasting in seed potato production in Hungary. Eur. Mediterr. Plant Protect. Organ. Pub. Ser. A 57:159-161. Shorter version in French, pp. 160-161.

REARING

Abasa, R. O. 1970. Reproductive biology of *Sarcophaga tibialis* (Diptera: Sarcophagidae). I. Life history with notes on prepupation mortality and pupation habits. Ent. Soc. Amer. Ann. 63(2):466-469.

Allen, W. R. and Askew, W. L. 1970. A simple technique for mass-rearing the onion maggot (Diptera: Anthomyiidae) on an artificial diet. Canad. Ent. 102(12):1554-1558.

Amin, O. M. and Sonenshine, D. E. 1970. Development of the American dog tick, *Dermacentor variabilis*, following partial feeding by immatures. Ent. Soc. Amer. Ann. 63(1):128-133.

Ben-Dov, Y. 1970. Laboratory rearing of wax scales. J. Econ. Ent. 63(6):1998-1999.

Bjarnov, N. and Thorup, J. 1970. A simple method for rearing running-water insects, with some preliminary results. Arch. f. Hydrobiol. 67(2):201-209.

Burton, R. L. 1970. A low-cost artificial diet for the corn earworm. J. Econ. Ent. 63(6):1969-1970.

Cannon, W. N., Jr. 1970. A disposable insulated container for rearing fall webworm larvae in the laboratory. Res. Note NE. Forest Expt. Sta. No. NE-123. 3 pp.

Chamberlain, W. F. and Hopkins, D. E. 1970. Morphological and physiological changes in *Bovicola limbata* (Mallophaga: Trichodectidae) reared on diet containing synthetic juvenile hormone. Ent. Soc. Amer. Ann. 63(5):1363-1365.

Colburn, R. and Asquith, D. 1970. A cage used to study the finding of a host by the ladybird beetle, *Stethorus punctum*. J. Econ. Ent. 63(4):1376-1377.

Davis, N. T. and Usinger, R. L. 1970. The biology and relationships of the Joppeicidae (Heteroptera). Ent. Soc. Amer. Ann. 63(2):577-587.

Downes, J. A. 1970. The feeding and mating behaviour of the specialized Empidinae (Diptera); observations on four species of *Rhamphomyia* in the high Arctic and a general discussion. Canad. Ent. 102(7):769-791.

Drooz, A. T. 1970. Rearing the elm spanworm on oak or hickory. J. Econ. Ent. 63(5):1581-1585.

Drooz, A. T. 1970. The elm spanworm (Lepidoptera: Geometridae): how several natural diets affect its biology. Ent. Soc. Amer. Ann. 63(2):391-397.

DuBose, W. P., Jr. 1970. Aerial spray tests with caged filth flies. Mosquito News 30(2):266.

Dupnik, T. D. and Kamm, J. A. 1970. Development of an artificial diet for *Crambus trisectus*. J. Econ. Ent. 63(5):1578-1581.

Dupnik, T. D. and Kamm, J. A. 1970. Notes on the biology and rearing of *Euchromius ocelleus*. J. Econ. Ent. 63(5):1677-1678.

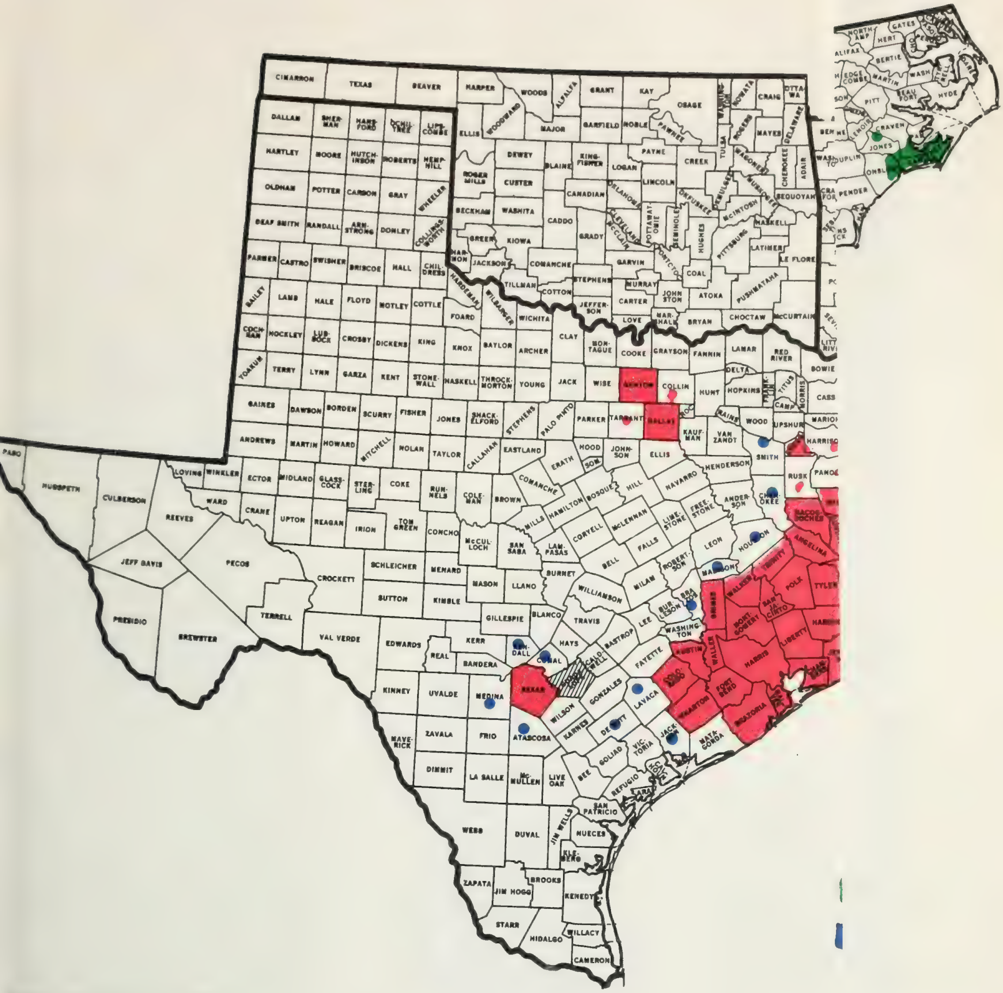
Elsey, K. D. and Rabb, R. L. 1970. Biology of *Voria ruralis* (Diptera: Tachinidae). Ent. Soc. Amer. Ann. 63(1):216-222.

Fatzinger, C. W. 1970. Aseptic techniques for rearing *Dioryctria abietella* (Lepidoptera: Pyralidae, Phycitinae) on artificial medium. Ent. Soc. Amer. Ann. 63(6):1716-1718.

Graham, C. L. and Capelle, K. J. 1970. Redescription of *Cuterebra polita* (Diptera: Cuterebridae) with notes on its taxonomy and biology. Ent. Soc. Amer. Ann. 63(6):1569-1573.

Greenberg, B., Kowalski, J., and Karpus, J. 1970. Micro-potentiometric pH determinations of the gut of *Periplaneta americana* fed three different diets. J. Econ. Ent. 63(6):1795-1797.

Grisdale, D. 1970. An improved laboratory method for rearing large numbers of spruce budworm, *Choristoneura fumiferana* (Lepidoptera: Tortricidae). Canad. Ent. 102(9):1111-1117.

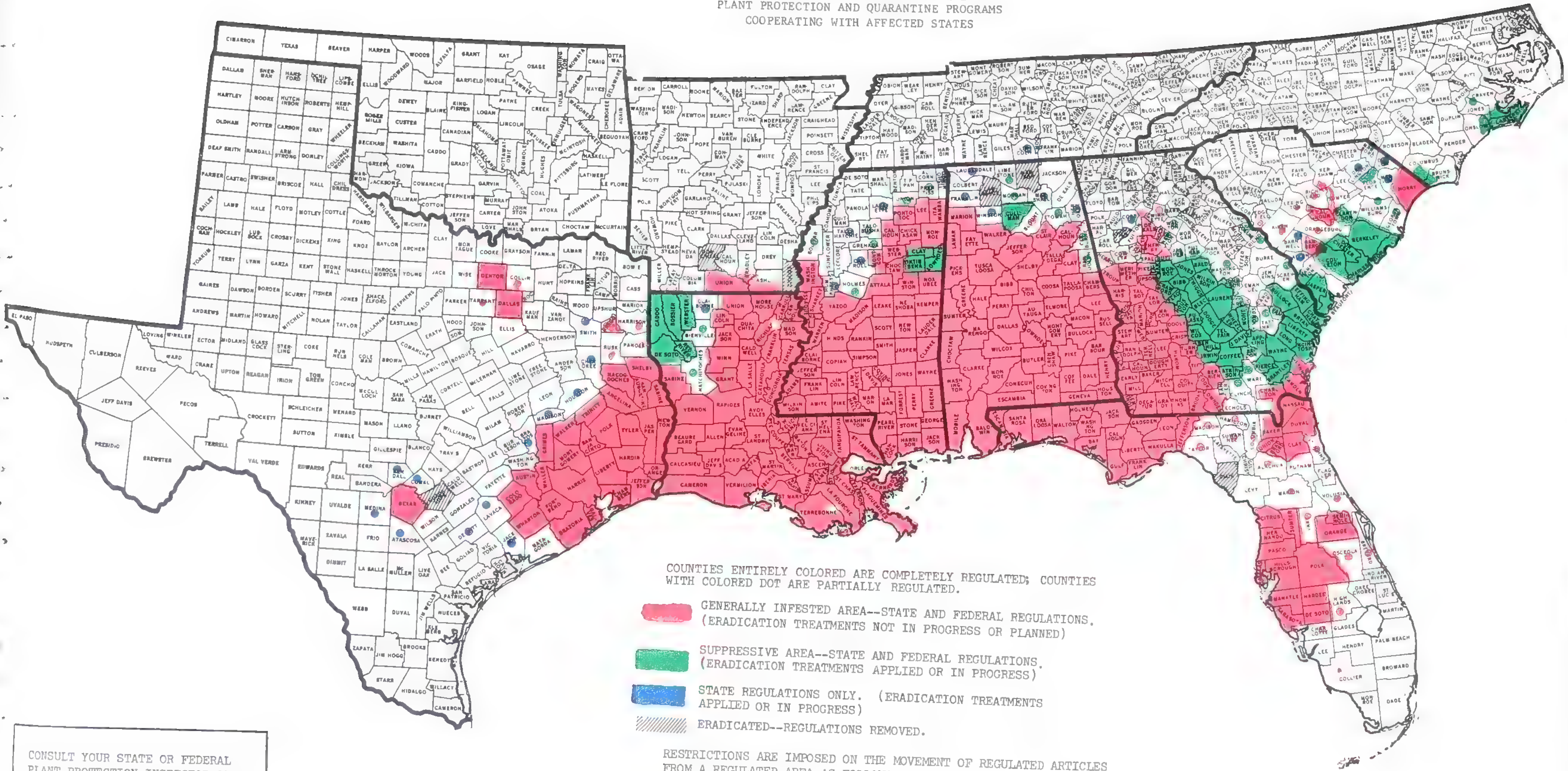


CONSULT YOUR STATE OR FEDERAL PLANT PROTECTION INSPECTOR OR YOUR COUNTY AGENT FOR ASSISTANCE REGARDING EXACT AREAS UNDER REGULATION AND REQUIREMENTS FOR MOVING REGULATED ARTICLES.

September 1971

IMPORTED FIRE ANT QUARANTINES

U.S. DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH SERVICE
PLANT PROTECTION AND QUARANTINE PROGRAMS
COOPERATING WITH AFFECTED STATES



COUNTIES ENTIRELY COLORED ARE COMPLETELY REGULATED; COUNTIES WITH COLORED DOT ARE PARTIALLY REGULATED.

🟥 GENERALLY INFESTED AREA--STATE AND FEDERAL REGULATIONS. (ERADICATION TREATMENTS NOT IN PROGRESS OR PLANNED)

🟩 SUPPRESSIVE AREA--STATE AND FEDERAL REGULATIONS. (ERADICATION TREATMENTS APPLIED OR IN PROGRESS)

🟦 STATE REGULATIONS ONLY. (ERADICATION TREATMENTS APPLIED OR IN PROGRESS)

▨ ERADICATED--REGULATIONS REMOVED.

RESTRICTIONS ARE IMPOSED ON THE MOVEMENT OF REGULATED ARTICLES FROM A REGULATED AREA AS FOLLOWS:

1. RED INTO OR THROUGH GREEN, BLUE, OR WHITE.
2. GREEN INTO OR THROUGH BLUE OR WHITE.
3. GREEN INTO GREEN.
4. GREEN WITHIN GREEN.*
5. BLUE INTO ANY OTHER AREA.**

*WHEN IT IS DETERMINED BY THE INSPECTOR THAT A HAZARD OF SPREAD EXISTS.

**ONLY WHEN REQUIRED BY STATE QUARANTINE REGULATIONS OR BY AN AUTHORIZED INSPECTOR.

(SEE REVERSE SIDE FOR LIST OF REGULATED ARTICLES)

CONSULT YOUR STATE OR FEDERAL PLANT PROTECTION INSPECTOR OR YOUR COUNTY AGENT FOR ASSISTANCE REGARDING EXACT AREAS UNDER REGULATION AND REQUIREMENTS FOR MOVING REGULATED ARTICLES.

REVISED September 1971

THE FOLLOWING REGULATED ARTICLES MOVED FROM GENERALLY INFESTED AREAS (RED) REQUIRE A CERTIFICATE OR PERMIT YEAR-ROUND EXCEPT AS INDICATED:*

1. Soil, compost, decomposed manure, humus, muck, and peat, separately or with other things.
    - Soil samples shipped to approved laboratories do not require attachment of certificate or permit.**
    - Compost, decomposed manure, humus, and peat are exempt***if dehydrated, ground, pulverized, or compressed.
2. Plants with roots.
3. Grass sod.
4. Hay and straw.
    - Hay and straw are exempt***if used for packing or bedding.
5. Logs, pulpwood, and stumpwood.
    - Logs and pulpwood are exempt***provided the railroad loading site has been treated.
    - Stumpwood, if free of excessive amounts of soil, is

Guerra, A. A. 1970. Effect of biologically active substances in the diet on development and reproduction of *Heliothis* spp. J. Econ. Ent. 63(5):1518-1521.

Harrell, E. A., Burton, R. L., and Sparks, A. N. 1970. A machine to manipulate corn earworm eggs in a mass-rearing program. J. Econ. Ent. 63(4):1362-1363.

Harris, R. L. and Frazar, E. D. 1970. Intake of blood by adult horn flies reared in the laboratory. Ent. Soc. Amer. Ann. 63(5):1475-1476.

Howell, J. F. 1970. Rearing the codling moth on an artificial diet. J. Econ. Ent. 63(4):1148-1150.

Ignoffo, C. M. and Gard, I. 1970. Use of an agar-base diet and house fly larvae to assay β-exotoxin activity of *Bacillus thuringiensis*. J. Econ. Ent. 63(6):1987-1989.

Jones, R. G. and Brindley, W. A. 1970. Tests of eight rearing media for the mountain pine beetle, *Dendroctonus ponderosae* (Coleoptera: Scolytidae), from lodgepole pine. Ent. Soc. Amer. Ann. 63(1):313-316.

Joseph, S. A. 1970. Laboratory rearing of fleas. Indian Vet. J. 47(1):89-90.

Kogan, M. and Goeden, R. D. 1970. The biology of *Lema trilineata daturaphila*, (Coleoptera: Chrysomelidae) with notes on efficiency of food utilization by larvae. Ent. Soc. Amer. Ann. 63(2):537-546.

Loor, K. A. and DeFoliart, G. R. 1970. Field observations on the biology of *Aedes triseriatus*. Mosquito News 30(1):60-64.

Mangat, B. S. 1970. Rearing the black cutworm in the laboratory. J. Econ. Ent. 63(4):1325-1326.

McDonald, I. C. 1970. Population cage studies with wild-type and mutant strains of the house fly. Ent. Soc. Amer. Ann. 63(1):187-191.

Mitsuhashi, J. 1970. A device for collecting planthopper and leafhopper eggs (Hemiptera: Delphacidae and Deltocephalidae). Appl. Ent. and Zool. 5(1):47-49.

Mittler, T. E. 1970. Uptake rates of plant sap and synthetic diet by the aphid *Myzus persicae*. Ent. Soc. Amer. Ann. 63(6):1701-1705.

Miura, T. 1970. A simple scum-free rearing technique for mosquito larvae. Ent. Soc. Amer. Ann. 63(5):1476-1477.

Moore, R. F., Jr., and Taft, H. M. 1970. Fatty acids in lipid fractions of early and late-stage larvae of *Heliothis zea* and in the diet. Ent. Soc. Amer. Ann. 63(5):1275-1279.

Moser, J. C. and Roton, L. M. 1970. Tagging mites with aerosol paint. Ent. Soc. Amer. Ann. 63(6):1784.

THE FOLLOWING REGULATED ARTICLES MOVED FROM GENERALLY INFESTED AREAS (RED) REQUIRE A CERTIFICATE OR PERMIT YEAR-ROUND EXCEPT AS INDICATED:*

1. Soil, compost, decomposed manure, humus, muck, and peat, separately or with other things.
   Soil samples shipped to approved laboratories do not require attachment of certificate or permit.**
   Compost, decomposed manure, humus, and peat are exempt***if dehydrated, ground, pulverized, or compressed.
2. Plants with roots.
3. Grass sod.
4. Hay and straw.
   Hay and straw are exempt***if used for packing or bedding.
5. Logs, pulpwood, and stumpwood.
   Logs and pulpwood are exempt***provided the railroad loading site has been treated.
   Stumpwood, if free of excessive amounts of soil, is exempt***provided the railroad loading site has been treated and the stumpwood is consigned to a processing plant.**
6. Used mechanized soil-moving equipment.
   Used mechanized soil-moving equipment is exempt***if cleaned and repainted.
7. Any other products, articles, or means of conveyance of any character whatsoever, not covered by the above, when it is determined by an inspector that they present a hazard of spread of the imported fire ant and the person in possession thereof has been so notified.

THE FOLLOWING REGULATED ARTICLES MOVED FROM SUPPRESSIVE (GREEN) AND STATE REGULATED (BLUE) AREAS REQUIRE A CERTIFICATE OR PERMIT YEAR-ROUND EXCEPT AS INDICATED:*

1. Bulk soil.
2. Used mechanized soil-moving equipment.
3. Any other products, articles, or means of conveyance of any character whatsoever, not covered by the above, when it is determined by an inspector that they present a hazard of spread of the imported fire ant and the person in possession thereof has been so notified.

* See "Restrictions Imposed on Movement of Regulated Articles" on the reverse side.

** Information as to designated laboratories and processing plants may be obtained from an inspector.

*** Exempt if not exposed to infestation after cleaning or other prescribed handling.

Muniappan, R. and Chada, H. L. 1970. Biology of the crab spider, *Misumenops celer*. Ent. Soc. Amer. Ann. 63(6):1718-1722.

Norris, D. M. and Chu, H. M. 1970. Nutrition of *Xyleborus ferrugineus*. II. A holidic diet for the aposymbiotic insect. Ent. Soc. Amer. Ann. 63(4):1142-1145.

Nyiira, Z. M. 1970. The biology and behavior of *Rhinocoris albopunctatus* (Hemiptera: Reduviidae). Ent. Soc. Amer. Ann. 63(5):1224-1227.

Oliver, B. F., Maxwell, F. G., and Jenkins, J. N. 1970. Utilization of glanded and glandless cotton diets by the bollworm. J. Econ. Ent. 63(6):1965-1966.

Orphanides, G. M. and Gonzalez, D. 1970. Importance of light in the biology of *Trichogramma pretiosum*. Ent. Soc. Amer. Ann. 63(6):1734-1740.

Parker, F. D. and Pinnell, R. E. 1970. Rearing the imported cabbageworm parasite *Apanteles rubecula* in the laboratory. J. Econ. Ent. 63(6):1993-1994.

Price, P. W. 1970. Biology of and host exploitation by *Pleolophus indistinctus* (Hymenoptera: Ichneumonidae). Ent. Soc. Amer. Ann. 63(6):1502-1509.

Putnam, W. L. 1970. Life history and behavior of *Balaustium putmani* (Acarina: Erythraeidae). Ent. Soc. Amer. Ann. 63(1): 76-81.

Raulston, J. R. and Shaver, T. N. 1970. A low agar casein-wheat germ diet for rearing tobacco budworms. J. Econ. Ent. 63(6): 1743-1744.

Richeson, J. S., Wilkinson, R. C., and Nation, J. L. 1970. Development of *Ips calligraphus* on foliage-based diets. J. Econ. Ent. 63(6):1797-1799.

Rings, R. W. 1970. Economic aspects of biology and control of oriental fruit moth, *Grapholitha molesta* Busck, in United States. Ohio J. Sci. 70(1):58-61.

Rutledge, L. C., Ward, R. A., and Bickley, W. E. 1970. Experimental hybridization of geographic strains of *Anopheles stephensi* (Diptera: Culicidae). Ent. Soc. Amer. Ann. 63(4): 1024-1030. Includes rearing

Saba, F. 1970. Parasites, predators, and diseases in a rearing culture of *Diabrotica balteata*. J. Econ. Ent. 63(5):1674.

Schroeder, W. J., Miyabara, R., and Chambers, D. L. 1970. A reusable diet support for rearing the melon fly on fluid larval medium. J. Econ. Ent. 63(6):2002.

Schwartz, J. L. and Lyon, R. L. 1970. Laboratory culture of orange tortrix, and its susceptibility to four insecticides. J. Econ. Ent. 63(6):1788-1790.

Schwartz, P. H., Jr., Jurimas, J. P., and Hickey, L. A. 1970. Substrata for rearing the Japanese beetle in the laboratory. Ent. Soc. Amer. Ann. 63(4):1083-1085.

Sharifi, S., Javadi, I., and Chemsak, J. A. 1970. Biology of the Rosaceae branch borer, *Osphranteria coerulescens* (Coleoptera: Cerambycidae). Ent. Soc. Amer. Ann. 63(6):1515-1520.

Sharifi, S. and Zarea, N. 1970. Biology of the citrus butterfly, *Papilio demoleus demoleus* (Lepidoptera: Papilionidae). Ent. Soc. Amer. Ann. 63(5):1211-1213.

Smilowitz, Z. and Smith, C. L. 1970. Distributions and frequencies of weight of cabbage looper larvae reared on artificial diet. J. Econ. Ent. 63(4):1106-1107.

Smith, J. C. and Newsom, L. D. 1970. The biology of *Amblyseius fallacis* (Acarina: Phytoseiidae) at various temperature and photoperiod regimes. Ent. Soc. Amer. Ann. 63(2):460-462.

Strong, F. E. and Kruitwagen, E. 1970. Gustatory discrimination between meridic diets by the bug, *Lygus hesperus*. J. Insect Physiol. 16(3):521-530.

Taschenberg, E. F. and Roelofs, W. L. 1970. Large-scale rearing of *Cecropia* (Lepidoptera: Saturniidae). Ent. Soc. Amer. Ann. 63(1):107-111.

Trpiš, M. and Shemanchuk, J. A. 1970. Effect of constant temperature on the larval development of *Aedes vexans* (Diptera: Culicidae). Canad. Ent. 102(8):1048-1051.

Tsitsipis, J. A. and Mittler, T. E. 1970. Convenient lighting system for inducting the production of sexual forms of aphids feeding on artificial diets. Ent. Soc. Amer. Ann. 63(6):1665-1667.

Webb, R. E. and Smith, F. F. 1970. Rearing a leaf miner, *Liriomyza munda*. J. Econ. Ent. 63(6):2009-2010.

Yazgan, S. and House, H. L. 1970. An hymenopterous insect, the parasitoid *Itoplectis conquisitor*, reared axenically on a chemically-defined synthetic diet. Canad. Ent. 102(10):1304-1306.

Yendol, W. G. 1970. Fatty acid composition of *Galleria* larvae, hemolymph, and diet (Lepidoptera: Galleriidae). Ent. Soc. Amer. Ann. 63(1):339-341.

EQUIPMENT AND TECHNIQUES

Bailey, D. L., LaBrecque, G. C., and Whitfield, T. L. 1970. A forced-air column for sex separation of adult house flies. J. Econ. Ent. 63(5):1451-1454.

Bhattacharya, A. K., Ameel, J. J., and Waldbauer, G. P. 1970. A method for sexing living pupal and adult yellow mealworms. Ent. Soc. Amer. Ann. 63(6):1783.

Brooke, J. P. and Holyome, B. J. 1970. Activity of two pyrethroids against blackfly larvae, determined by a simple laboratory technique. Pesticide Sci. 1(4):123-125.

Burgdorfer, W. 1970. Hemolymph test. A technique for detection of rickettsiae in ticks. Amer. J. Trop. Med. and Hyg. 19(6): 1010-1014.

Burton, R. L. and Snow, J. W. 1970. A marker dye for the corn earworm. J. Econ. Ent. 63(6):1976-1977.

Candy, D. J. 1970. Metabolic studies on locust flight muscle using a new perfusion technique. J. Insect Physiol. 16(3): 531-543.

Fatzinger, C. W. 1970. Aseptic techniques for rearing *Dioryctria abietella* (Lepidoptera: Pyralidae, Phycitinae) on artificial medium. Ent. Soc. Amer. Ann. 63(6):1716-1718.

Geer, B. W., Olander, R. M., and Sharp, P. L. 1970. Quantification of dietary choline utilization in adult *Drosophila melanogaster* by radioisotope methods. J. Insect Physiol. 16(1):33-43.

Graham, H. M. 1970. A method of shipping large numbers of pink bollworm adults. J. Econ. Ent. 63(6):2007-2008.

Hagstrum, D. W. and Hagstrum, W. R. 1970. A simple device for producing fluctuating temperatures, with an evaluation of the ecological significance of fluctuating temperatures. Ent. Soc. Amer. Ann. 63(5):1385-1389.

Hanna, M. A. and Hibbs, E. T. 1970. Feeding phytophagous mites on liquid formulations. J. Econ. Ent. 63(5):1672-1674.

Harris, K. F. and Khalaf, K. T. 1970. A method for microtopographical studies of the surface of insect cuticle using conventional transmission electron microscopy. Ent. Soc. Amer. Ann. 63(5):1462-1465.

Hart, J. R. 1970. A flotation method for determining extent of weevil infestation in peas. J. Econ. Ent. 63(4):1060-1062.

Hayes, D. K., Schechter, M. S., and Wash, D. B. 1970. Disc electrophoresis as a micropreparative technique for hemolymph and soluble tissue proteins. Ent. Soc. Amer. Ann. 63(4):1092-1095.

Hoffman, J. D., Ertle, L. R., Brown, J. B., and Lawson, F. R. 1970. Techniques for collecting, holding, and determining parasitism of lepidopterous eggs. J. Econ. Ent. 63(4):1367-1369.

Ignoffo, C. M. and Boening, O. P. 1970. Compartmented disposable plastic trays for rearing insects. J. Econ. Ent. 63(5):1696-1697.

Kadoum, A. M. and Anderson, C. C., III. 1970. A simple liquid density-gradient mixer. J. Econ. Ent. 63(6):1978-1979.

Kennedy, B. H. 1970. A device for separating and holding small photopositive insects. J. Econ. Ent. 63(5):1697-1698.

Kuehl, R. O. and Fye, R. E. 1970. Efficiency of grid stratification in cotton fields for cotton-insect surveys. J. Econ. Ent. 63(6):1864-1866.

Lee, S. C., Yoo, J. K., and Yoo, C. Y. 1970. Survey on the kinds of the fruit sucking moths and their damages in Korea (II). J. Plant Protect. (Korea) 9(2):99-102. In Jap., Engl. Sum.

Lewallen, L. L. 1970. A method of evaluating mosquito larvicides utilizing the ultra-low-volume technique on small plots. Mosquito News 30(2):262-264.

Miller, A. and Harris, R. L. 1970. A collector for studying the emergence pattern of flies. J. Econ. Ent. 63(5):1682-1683.

Morrison, R. K. 1970. A simple cage for maintaining parasites. Ent. Soc. Amer. Ann. 63(2):625-626.

Mukerji, M. K. and Harcourt, D. G. 1970. Design of a sampling plan for studies on the population dynamics of the cabbage maggot, *Hylemya brassicae* (Diptera: Anthomyiidae). Canad. Ent. 102(12):1513-1518.

Musick, G. J. and Fairchild, M. L. 1970. Field emergence cage for corn rootworm adults. J. Econ. Ent. 63(5):1710-1711.

Nettles, W. C., Kissam, J. B., and Adkins, T. R. 1970. Let cattle control pests with self-treatment devices. Clemson Univ. Ext. Cir. 392, rev. 13 pp.

Peleg, B. A. and Rhode, R. H. 1970. New larval medium and improved pupal recovery method for the Mediterranean fruit fly in Costa Rica. J. Econ. Ent. 63(4):1319-1321.

Procaccini, D. J., Marks, L. S., and Cicero, J. 1970. Two techniques for dissecting and mounting genitalia of male butterflies (Lepidoptera). Ent. Soc. Amer. Ann. 63(4):1190.

Ramsy, A. H. 1970. A laboratory technique for mass rearing of a phytoseiid mite. Z. Angew. Ent. 65(2):159-161.

Riordan, D. F. and Peschken, D. P. 1970. A method for obtaining P^{32}-labelled eggs of the flea beetle *Altica carduorum* (Coleoptera: Chrysomelidae). Canad. Ent. 102(12):1613-1616.

Rummel, R. W. and Turner, E. C., Jr. 1970. A refined technique for counting face fly eggs. J. Econ. Ent. 63(4):1378-1379.

Safranyik, L. and Raske, A. G. 1970. Sequential sampling plan for larvae of *Monochamus* in lodgepole pine logs. J. Econ. Ent. 63(6):1903-1906.

Scarbrough, A. G., Waldbauer, G. P., and Sternburg, J. G. 1970. A method for associating cocoons and marked last-stage larvae. Ent. Soc. Amer. Ann. 63(5):1481.

Schroder, R. F. W. 1970. A modified suction machine for sampling populations of alfalfa weevils on alfalfa. J. Econ. Ent. 63(4):1329-1330.

Wearne, G. R. and Whitten, M. J. 1970. A low-cost collapsible modular cage. J. Econ. Ent. 63(5):1685-1686.

White, E. G. 1970. A self-checking coding technique for mark-recapture studies. Bul. Ent. Res. 60(2):303-307.

Wilson, G. R. 1970. A chamber for management of circadian rhythms of light for small insects. J. Econ. Ent. 63(5):1676-1677.

Wood, G. W. and Small, D. N. 1970. A method of sampling for adults of *Chlamisus cribripennis*. J. Econ. Ent. 63(4):1361-1362.

See also Leigh under Population Measurement and Harrell under Rearing.

TRAPS

Banerjee, B. 1970. A mathematical model on sampling diplopods using pitfall traps. Oecologia 4(1):102-105.

Bertram, D. S., Varma, M. G. R., Page, R. C., and Heathcote, O. H. U. 1970. A Betalight trap for mosquito larvae. J. Med. Ent. 7(2):267-270.

Braverman, Y. 1970. An improved emergence trap for *Culicoides*. J. Econ. Ent. 63(5):1674-1675.

Bucher, G. E. and Cheng, H. H. 1970. Use of trap plants for attracting cutworm larvae. Canad. Ent. 102(7):797-798.

Buckley, D. J. and Stewart, W. W. A. 1970. A light-activated switch for controlling battery-operated light traps. Canad. Ent. 102(7):911-912.

Burgess, R. J. and Muir, R. C. 1970. A modification of the Johnson-Taylor suction trap to provide a twelve-hour segregation of the catch. E. Malling Res. Sta. Rpt. 57:169-170 (1969).

Davich, T. B. 1970. Trapping of weevils by sex lure in reproduction-diapause control areas. Cotton Prod-Mech. Conf. Sum-Proc. pp. 12-15.
Anthonomus grandis

Davich, T. B., Hardee, D. D., and Alcála M., J. 1970. Long-range dispersal of boll weevils determined with wing traps baited with males. J. Econ. Ent. 63(5):1706-1708.

Dickerson, W. A., Gentry, C. R., and Mitchell, W. G. 1970. A rainfree collecting container that separates desired Lepidoptera from smaller undesired insects in light traps. J. Econ. Ent. 63(4):1371.

Dresner, E. 1970. A sticky trap for Mediterranean fruit fly survey. J. Econ. Ent. 63(6):1813-1816.

Fay, R. W. and Prince, W. H. 1970. A modified visual trap for *Aedes aegypti*. Mosquito News 30(1):20-23.

Frost, S. W. 1970. A trap to test the response of insects to various light intensities. J. Econ. Ent. 63(4):1344-1346.

Gladney, W. J. and Turner, E. C., Jr. 1970. Mosquito flight activity studies utilizing timer-equipped light traps and Malaise traps. Mosquito News 30(1):75-80.
Culicidae

Granger, C. A. 1970. Trap design and color as factors in trapping the salt marsh greenhead fly. J. Econ. Ent. 63(5):1670-1672.

Hamilton, D. W., Schwartz, P. H., and Townshend, B. G. 1970. Capture of bumble bees and honey bees in traps baited with lures to attract Japanese beetles. J. Econ. Ent. 63(5):1442-1445.

Hardee, D. D., Cross, W. H., Huddleston, P. M., and Davich, T. B. 1970. Survey and control of the boll weevil in west Texas with traps baited with males. J. Econ. Ent. 63(4):1041-1048.

Heathcote, G. D. 1970. The abundance of grass aphids in eastern England as shown by sticky trap catches. Plant Pathol. 19(2):87-90.

Husbands, R. C. and Reed, D. E. 1970. A comparison of larval mosquito species occurrence and light trap data. Calif. Mosquito Cont. Assoc. Proc. Pap. 37:101-108.

Jones, G. A. and Thurston, R. 1970. Effect of an area program using blacklight traps to control populations of tobacco hornworms and tomato hornworms in Kentucky. J. Econ. Ent. 63(4):1187-1194.

Kirkpatrick, R. L., Yancey, D. L., and Marzke, F. O. 1970. Effectiveness of green and ultraviolet light in attracting stored-product insects to traps. J. Econ. Ent. 63(6):1853-1855.

Knudsen, A. B. and Rees, D. M. 1970. Collecting adult tabanids using a "stickem" trap baited with carbon dioxide. Calif. Mosquito Cont. Assoc. Proc. Pap. 37:129-132.

Miller, T. A., Stryker, R. G., Wilkinson, R. N., and Esah, S. 1970. The influence of moonlight and other environmental factors on the abundance of certain mosquito species in light-trap collections in Thailand. J. Med. Ent. 7(5):555-561.

Nord, J. C. and Lewis, W. G. 1970. Two emergence traps for wood-boring insects. Ga. Ent. Soc. J. 5(3):155-157.

Patrick, J. C. and Hensley, S. D. 1970. Recapture of males released at different distances from a trap baited with virgin female sugarcane borers. J. Econ. Ent. 63(4):1341-1342.

Porter, C. H. and Gojmerac, W. L. 1970. Temperature; its influence on light trap catches of Aedes vexans (Meigen). Mosquito News 30(1):54-56.

Roberts, R. H. 1970. Tabanidae collected in a Malaise trap baited with CO_2. Mosquito News 30(1):52-53.

Rockel, E. G. and Hansens, E. J. 1970. Emergence and flight activity of salt-marsh horse flies and deer flies. Ent. Soc. Amer. Ann. 63(1):27-31.

Roelofs, W. L., Glass, E. H., Tette, J., and Comeau, A. 1970. Sex pheromone trapping for red-banded leaf roller control: theoretical and actual. J. Econ. Ent. 63(4):1162-1167.

Stanley, J. M. and Dominick, C. B. 1970. Funnel size and lamp wattage influence on light-trap performance. J. Econ. Ent. 63(5):1423-1426.

Stewart, J. D. and Shimanuki, H. 1970. Rapid-sample pollen trap for honey bees. J. Econ. Ent. 63(4):1350.

Stewart, P. A. 1970. Effect of traps equipped with blacklight lamps on infestations of lepidopteran larvae in field corn ears. J. Econ. Ent. 63(6):1974.

Suda, D. Y. and Cunningham, R. T. 1970. Chrysopa basalis captured in plastic traps containing methyl eugenol. J. Econ. Ent. 63(5):1706.

Tedders, W. L., Jr., and Edwards, G. 1970. Activity of hickory shuckworm from collections in traps. J. Econ. Ent. 63(5): 1610-1611.

Tomlinson, W. E., Jr. 1970. Effect of blacklight trap height on catches of moths of three cranberry insects. J. Econ. Ent. 63(5):1678-1679.

Waters, N. D. 1970. Lights and water traps for alfalfa leafcutter bee incubators. Idaho Univ. Ext. Idaho Curr. Inform. Ser. 120. 4 pp.

White, L. D., Backus, D. A., and Hutt, R. B. 1970. Damage to fruit and leaves of apple trees caused by bactericidal ultraviolet light used to trap codling moths. J. Econ. Ent. 63(3):1003-1004.

Wilson, B. H. and Richardson, C. G. 1970. Attraction of deer flies (Chrysops) (Diptera: Tabanidae) to traps baited with dry ice under field conditions in Louisiana. J. Med. Ent. 7(5):625.

Yabe, T., Moriya, K., and Harada, F. 1970. Seasonal prevalence of moth flies collected by light traps at pigpens and a hen-house. Jap. J. Sanit. Zool. 20(4):248-252. In Jap., Engl. Sum.

Albert, P. J., Seabrook, W. D., and Paim, U. 1970. The antennae as the site of pheromone receptors in the eastern spruce budworm, Choristoneura fumiferana (Lepidoptera: Tortricidae). Canad. Ent. 102(12):1610-1612.

Bodenstein, W. G. 1970. Distribution of female sex pheromone in the gut of Periplaneta americana (Orthoptera: Blattidae). Ent. Soc. Amer. Ann. 63(1):336-337.

Bosman, T. 1970. The sex pheromones of insects. S. Afr. J. Sci. 66(7):228-232.

Bucher, G. E. and Cheng, H. H. 1970. Use of trap plants for attracting cutworm larvae. Canad. Ent. 102(7):797-798.

Choi, S. Y. and Song, Y. H. 1970. Field studies on the sex attraction of the fall webworm moths (Hyphantria cunea D.) and the development of sex-attractant trap. J. Plant Protect. (Korea) 9(2):85-90. In Jap., Engl. Sum.

Coster, J. E. 1970. Production of aggregating pheromones in re-emerged parent females of the southern pine beetle. Ent. Soc. Amer. Ann. 63(4):1186-1187.

Crew, R. M. and Blum, M. S. 1970. Identification of the alarm pheromones of the ant Myrmica brevinodis. J. Insect Physiol. 16(1):141-146.

Cucchi, N. J. A., Puiatti, A. E., and García, M. F. 1970. Observations on the effectiveness of some attractants for the fruit-fly in Mendoza. Estac. Expt. Agr. Tucumán Misc. Pub. 32:16-28.

Dateman, G. E. and McComb, D. 1970. Female sex attractant for survey trapping European pine shoot moth. J. Econ. Ent. 63(5):1406-1409.

Fincher, G. T., Stewart, T. B., and Davis, R. 1970. Attraction of coprophagous beetles to feces of various animals. J. Parasitol. 56(2):378-383.

Gillies, M. T. and Wilkes, T. J. 1970. The range of attraction of single baits for some West African mosquitoes. Bul. Ent. Res. 60(2):225-235.

Glancey, B. M. and Coauthors. 1970. Pheromone may induce brood tending in the fire ant, Solenopsis saevissima. Nature (London) 226(5248):863-864.

González, D., Orphanides, G., van den Bosch, R., and Leigh, T. F. 1970. Field-cage assessment of Trichogramma as parasites of Heliothis zea: development of methods. J. Econ. Ent. 63(4): 1292-1296.

Gueldner, R. C., Thompson, A. C., Hardee, D. D., and Hedin, P. A. 1970. Constituents of the cotton bud. XIX. Attractancy to the boll weevil of the terpenoids and related plant constituents. J. Econ. Ent. 63(6):1819-1821.

Hammond, A. M. and Hensley, S. D. 1970. A bioassay for the sex attractant in the sugarcane borer. Ent. Soc. Amer. Ann. 63(1):64-66.

Happ, G. M. 1970. Maturation of the response of male *Tenebrio molitor* to the female sex pheromone. Ent. Soc. Amer. Ann. 63(6):1782.

Ikeshoji, T. and Mulla, M. S. 1970. Oviposition attractants for four species of mosquitoes in natural breeding waters. Ent. Soc. Amer. Ann. 63(5):1322-1327.

Ishii, S. 1970. An aggregation pheromone of the German cockroach, *Blattella germanica* (L.). 2. Species specificity of the pheromone. Appl. Ent. and Zool. 5(1):33-41.

Jacobson, M., Redfern, R. E., Jones, W. A., and Aldridge, M. H. 1970. Sex pheromones of the southern armyworm moth: isolation, identification, and synthesis. Science 170(3957):542-544.

Jacobson, M., Sonnet, P. E., Adler, V. E., and Cook, D. 1970. Inactivity of a preparation reported to be highly active as a gypsy moth sex attractant. Ent. Soc. Amer. Ann. 63(2): 614-615.

Jefferson, R. N. and Rubin, R. E. 1970. Sex pheromones of noctuid moths. XVII. A clarification of the description of the female sex pheromone gland of *Prodenia litura*. Ent. Soc. Amer. Ann. 63(2):431-433.

Jefferson, R. N., Rubin, R. E., McFarland, S. U., and Shorey, H. H. 1970. Sex pheromones of noctuid moths. XXII. The external morphology of the antennae of *Trichoplusia ni*, *Heliothis zea*, *Prodenia ornithogalli*, and *Spodoptera exigua*. Ent. Soc. Amer. Ann. 63(5):1227-1238.

Khan, A. A., Maibach, H. I., Strauss, W. G., and Fisher, J. L. 1970. Differential attraction of the yellow fever mosquito to vertebrate hosts. Mosquito News 30(1):43-47.

Kinzer, H. G., Burns, I. W., and Auclair, J. L. 1970. An olfactometer for measuring host attraction in the horn fly. J. Econ. Ent. 63(4):1335-1337.

Kirkpatrick, R. L., Yancey, D. L., and Marzke, F. O. 1970. Effectiveness of green and ultraviolet light in attracting stored-product insects to traps. J. Econ. Ent. 63(6):1853-1855.

Kishaba, A. N. and Coauthors. 1970. Light and synthetic pheromone as attractants for male cabbage loopers. J. Econ. Ent. 63(5):1417-1420.

Lanier, G. N. 1970. Sex pheromones: abolition of specificity in hybrid bark beetles. Science 169(3940):71-72.
Scolytidae

Legner, E. F. 1970. Attraction of *Hippelates* eye gnats and other minute Diptera to baits and man with considerations on competitive displacement by exotic non--problem species. Calif. Mosquito Cont. Assoc. Proc. Pap. 37:119-126.

Levinson, H. Z. and Bar Ilan, A. R. 1970. Lack of an intraspecific attractant in male *Trogoderma granarium*. Riv. di Parassitol. 31(1):70-72.

MacFarlane, J. H. and Earle, N. W. 1970. Morphology and histology of the female sex pheromone gland of the salt-marsh caterpillar, *Estigmene acrea*. Ent. Soc. Amer. Ann. 63(5):1327-1332.

Mayer, M. S. and James, J. D. 1970. Attraction of *Aedes aegypti*. II. Velocity of reaction to host with and without additional carbon dioxide. Ent. Expt. et Appl. 13(1):47-53. Ger. Sum.

McGovern, T. P. and Coauthors. 1970. Esters highly attractive to *Vespula* spp. J. Econ. Ent. 63(5):1534-1536.

McGovern, T. P. and Coauthors. 1970. Phenethyl propionate, a potent new attractant for Japanese beetles. J. Econ. Ent. 63(6):1727-1729.

McGovern, T. P. and Beroza, M. 1970. Volatility and compositional changes of Japanese beetle attractant mixtures and means of dispensing sufficient vapor having a constant composition. J. Econ. Ent. 63(5):1475-1479.

McGovern, T. P., Gouck, H. K., Beroza, M., and Ingangi, J. C. 1970. Esters of α-hydroxy-β-phenyl aliphatic acids that attract female yellow-fever mosquitoes. J. Econ. Ent. 63(6):2002-2004.

Menon, M. 1970. Hormone-pheromone relationships in the beetle, *Tenebrio molitor*. J. Insect Physiol. 16(6):1123-1139.

Moeck, H. A. 1970. An olfactometer for the bio-assay of attractants for scolytids. Canad. Ent. 102(7):792-796.

Moeck, H. A. 1970. Ethanol as the primary attractant for the ambrosia beetle *Trypodendron lineatum* (Coleoptera: Scolytidae). Canad. Ent. 102(8):985-995.

Nijholt, W. W. 1970. The effect of mating and the presence of the male ambrosia beetle, *Trypodendron lineatum*, on "secondary" attraction. Canad. Ent. 102(7):894-897.

Nolte, D. J., May, I. R., and Thomas, B. M. 1970. The gregarisation pheromone of locusts. Chromosoma 29(4):462-473.

Osborne, G. O. and Hoyt, C. P. 1970. Phenolic resins as chemical attractants for males of the grass grub beetle, *Costelytra zealandica* (Coleoptera: Scarabaeidae). Ent. Soc. Amer. Ann. 63(4):1145-1147.

Payne, T. L., Shorey, H. H., and Gaston, L. K. 1970. Sex pheromones of noctuid moths: factors influencing antennal responsiveness in males of Trichoplusia ni. J. Insect Physiol. 16(6):1043-1055.

Shorey, H. H. and Bartell, R. J. 1970. Role of a volatile female sex pheromone in stimulating male courtship behaviour in Drosophila melanogaster. Anim. Behav. 18(1):159-164.

Smith, F. F. and Boswell, A. L. 1970. New baits and attractants for slugs. J. Econ. Ent. 63(6):1919-1922.

Sower, L. L., Shorey, H. H., and Gaston, L. K. 1970. Sex pheromones of noctuid moths. XXI. Light:dark cycle regulation and light inhibition of sex pheromone release by females of Trichoplusia ni. Ent. Soc. Amer. Ann. 63(4):1090-1092.

Stanić, V., Zlotkin, E., and Shulov, A. 1970. Localization of pheromone excretion in the female of Trogoderma granarium (Dermestidae). Ent. Expt. et Appl. 13(3):342-351.

Strong, L. 1970. Epidermis and pheromone production in males of the desert locust. Nature (London) 228(5268):285-286.

Teetes, G. L. and Randolph, N. M. 1970. Color preference and sex attraction among sunflower moths. J. Econ. Ent. 63(4):1358-1359.

Toba, H. H. and Coauthors. 1970. Response of male cabbage loopers to 15 isomers and congeners of the looper pheromone. J. Econ. Ent. 63(4):1048-1051.

Turica, A. 1970. The main attractants for fruit-flies and the influence of temperature. Estac. Expt. Agr. Tucumán Misc. Pub. 32:7. Sum. only.

Yonce, C. E. and Gentry, C. R. 1970. Bait for oriental fruit moth attracts lesser peach tree borer moths. J. Econ. Ent. 63(6):1976.

Prepared by Economic Insect
Survey and Detection Staff
May 12, 1972

U.S. Dept. Agr.
Coop. Econ. Ins. Rpt.
22(20):285-298, 1972

U.S. DEPARTMENT OF AGRICULTURE
HYATTSVILLE, MARYLAND 20782

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF
AGRICULTURE

U.S.MAIL